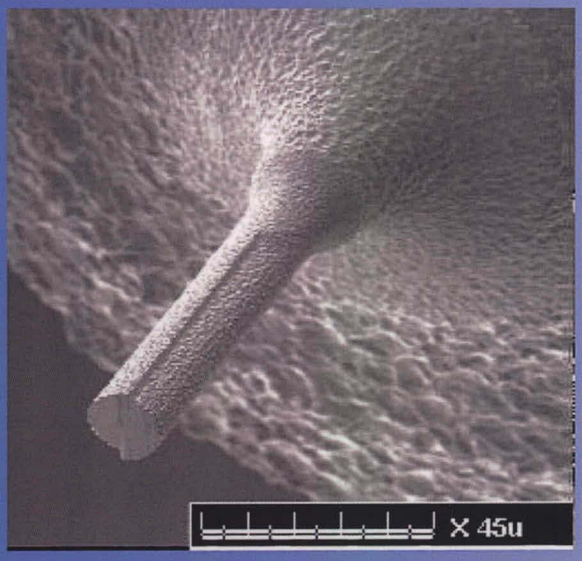
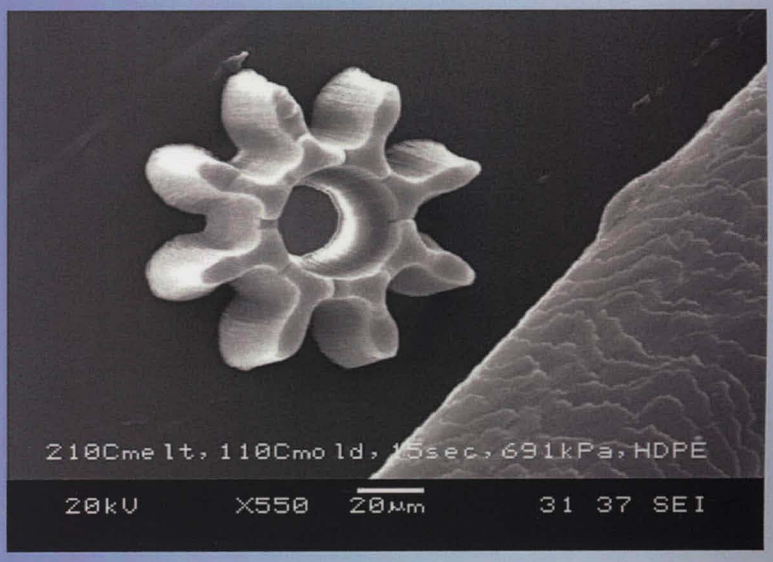
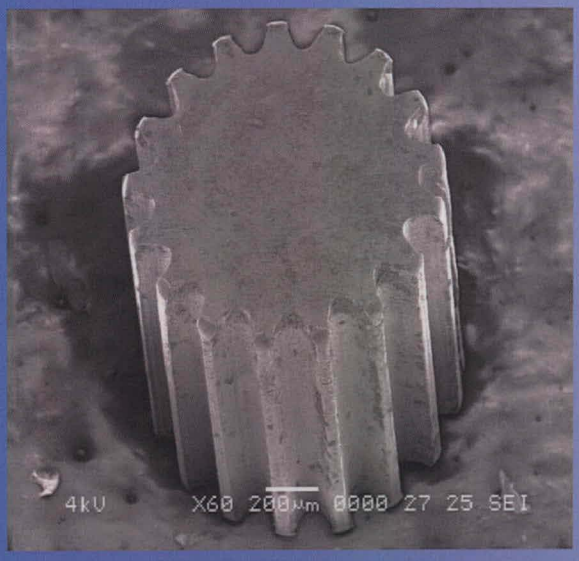
Advanced Machining Process







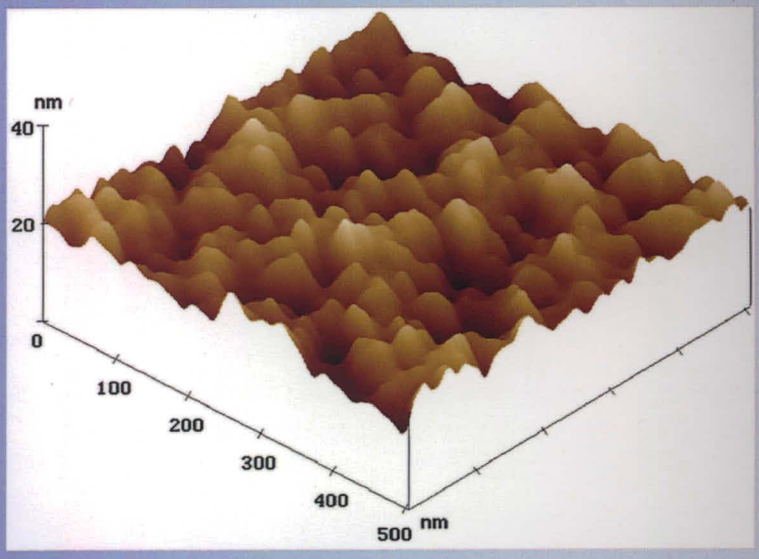


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Table of Contents

Chapter 12

A Comparative study on Work Surface Hardness EDMed by Ta-C Powder Compacted and Copper Electrodes

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Keywords: Electrical discharge machining (EDM); Tantalum-carbide; Copper; Electrode; Hardness

Abstract. Tantalum-carbide and solid copper electrodes were used to EDM mild steel. Current, spark on-time and off-time were taken as the machining variables. It was found that work surface hardness increases while machining with high current and on-time. However, increase in spark off-time results decrease in work surface hardness. It was also found that the surface machined with pure copper electrodes is harder than that machined by tantalum-carbide powder metallurgy compacted electrodes.

Introduction

The application of electrical discharge machining (EDM) is increasing rapidly in making dies and molds with hard materials that cannot be machined with conventional machining techniques. 2]. The present work focuses on the development of powder metallurgy compacted electrodes for EDM. The types of powders used are tantalum carbide (TaC) and copper (Cu). Both of these materials are mixed and compressed together to produce an electrode which can be used for EDM and known as green compacted electrodes. The electrode was glued to a solid copper piece to get the suitable length of the electrode so that it could be fixed to the machine (Fig.1). The parameters manipulated during the experiments are current, spark on-time and spark off-time.

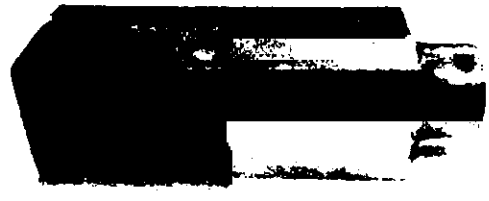

Fig.1: TaC/Cu green compacted electrode joined with a copper holder